



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Statistical methods in scientific research

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### Course

Field of study

Year/Semester

Engineering management

1/1

Area of study (specialization)

Profile of study

general academic

Level of study

Course offered in

Second-cycle studies

Polish

Form of study

Requirements

part-time

compulsory

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### Number of hours

Lecture

Laboratory classes

Other (e.g. online)

10

Tutorials

Projects/seminars

10

### Number of credit points

3

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### Lecturers

Responsible for the course/lecturer:

Responsible for the course/lecturer:

Dr Alina Gleska

Institute of Mathematics

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### Prerequisites

1. The student has knowledge of mathematics in the field of mathematical analysis and probability theory and is able to use a calculator and statistical tables
2. The student has the ability to think logically, associate facts, analyze issues and correctly reasoning
3. The student is aware of the need to know the methods of data analysis when studying various subjects in the field of management engineering

### Course objective

The aim of the course is to learn the basic methods of mathematical statistics and to gain the ability to apply acquired knowledge to analyze problems in various fields, including technical



### Course-related learning outcomes

#### Knowledge

1. The student knows the methods and tools of mathematical statistics and their application to model processes and phenomena occurring in organizations (P7S\_WG\_03)
2. The student knows the appropriate computational techniques and programming, supporting the methods of mathematical statistics and understands their limitations (P7S\_WG\_02)

#### Skills

1. The student is able to use theoretical knowledge to describe and analyze the causes and course of social processes and phenomena (cultural, political, legal, economic) and is able to form their own opinions and select critical data and methods of analysis (P7S\_UW\_01)
2. The student is able to correctly interpret and explain social, cultural, political, legal, economic phenomena and mutual relations between social phenomena (P7S\_UW\_06)
3. The student is able to properly analyze the causes and course of social processes and phenomena (cultural, political, legal, economic), formulate their own opinions on this subject and put simple research hypotheses and verify them (P7S\_UW\_07)

#### Social competences

1. The student understands the need for further education and development of acquired skills (P7S\_KK\_01)
2. The student is able to properly set priorities for the implementation of the task specified by himself or other (P7S\_KK\_02)
3. The student understands the social aspects of the practical application of acquired knowledge and the associated responsibility (P7S\_KR\_02)
4. The student is able to act in an entrepreneurial manner (P7S\_KO\_03)

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture - written final test

Tutorials - one long test + activity

Assessment criteria:

below 50% - 2,0	50%-59% - 3,0	60%-69% - 3,5
70%-79% - 4,0	80%-89% - 4,5	90%-100% - 5,0

### Programme content

1. A reference to elements of descriptive statistics, such as arithmetic mean, variance, standard deviation, proportion for both detailed and grouped series



2. Elements of probability theory - random events, classical and axiomatic definition of probability, probability properties, conditional and total probability, Bayes formula
3. Discrete random variables, their distributions and characteristics
4. Continuous random variables, their distributions and characteristics
5. Point and interval estimation of the population average, variance and standard deviation, and proportions in the population

### Teaching methods

Lecture - multimedial presentation + short examples on the blackboard + long examples using MS Excel

Tutorials - solving problems; discussion about obtained results

### Bibliography

#### Basic

1. E. Wasilewska, Statystyka matematyczna w praktyce, Wydawnictwo Difin, 2015. (księg. stud. E1, W 157580)
2. M. Sobczyk, Statystyka, Wydawnictwo Naukowe PWN, 2007. (1998 – księg. stud. A2, W 146934; 2007 - czytelnia)
3. W. Kryszcki, J. Bartos, W. Dyczka, K. Królikowska i M. Wasilewski, Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach, cz. II, PWN Warszawa, 1986. (księg. stud. E1, W 60812/2)
4. D. Bobrowski, K. Maćkowiak-Łybacka, Wybrane metody wnioskowania statystycznego, Wyd. PP, Poznań 2004. (księg. stud. E1, W 51326)

#### Additional

1. M. Krzyśko, Wykłady z teorii prawdopodobieństwa, WNT, 2000. (księg. stud. E1, W 92928)
2. M. Krzyśko, Statystyka matematyczna, WN UAM, 1996. (magazyn główny, Mg 192754)

### Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	20	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	55	2,0

<sup>1</sup> delete or add other activities as appropriate